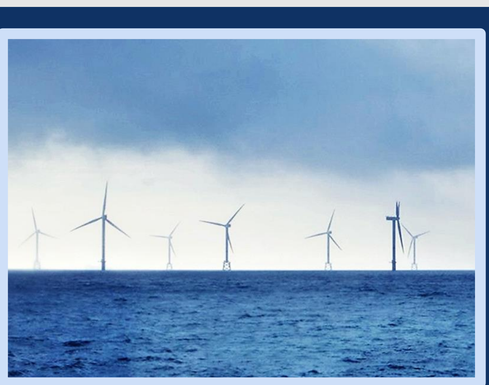
Ajie Pribadi[1], Luca Donatini[1], Evert Lataire[1], Marc Vantorre[1], Nancy Nevejan[2], Peter Bossier[2]

Maritime Technology Division, Ghent University[1], Laboratory of Aquaculture & Artemia Reference Center, Ghent University[2]

# MUSSEL CULTIVATION IN THE BELGIAN NORTH SEA

**Introduction**: A research project to examine the feasibility of growing mussels off the coast was initiated within the project named Edulis. The partners of Edulis project are: ILVO, UGent, OD Nature, C-Power, Belwind, DEME, Sioen Industries, Colruyt Group, Brevisco and Lobster Fish. In this collaboration, Maritime Technology Division of Ghent University takes part in the numerical modelling of the mussel line system.



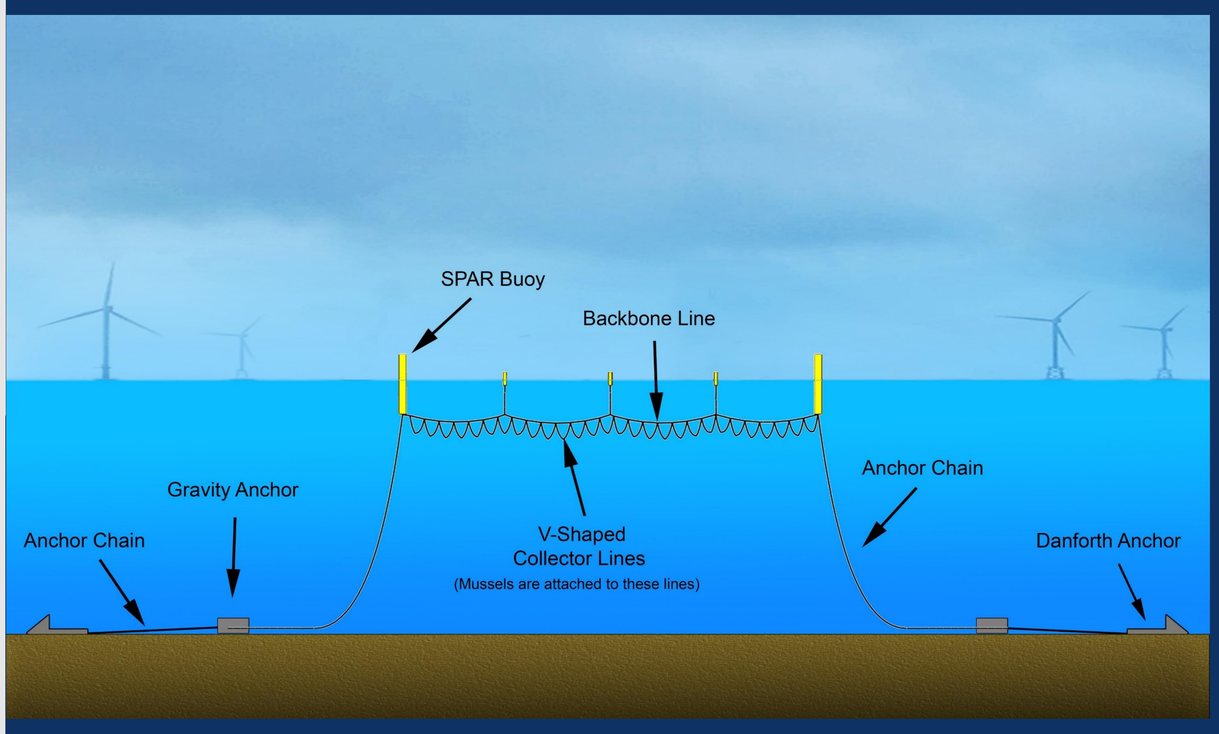
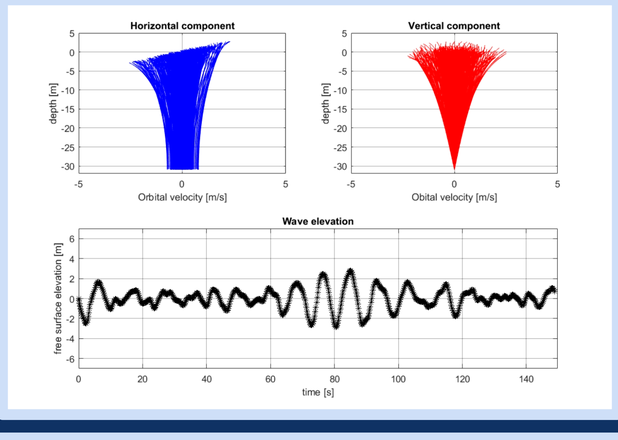



Illustration of a semi submerged longline system that is considered for the study. (length not drawn to scale)

**Two experimental test setups** were installed for the purpose of data gathering.

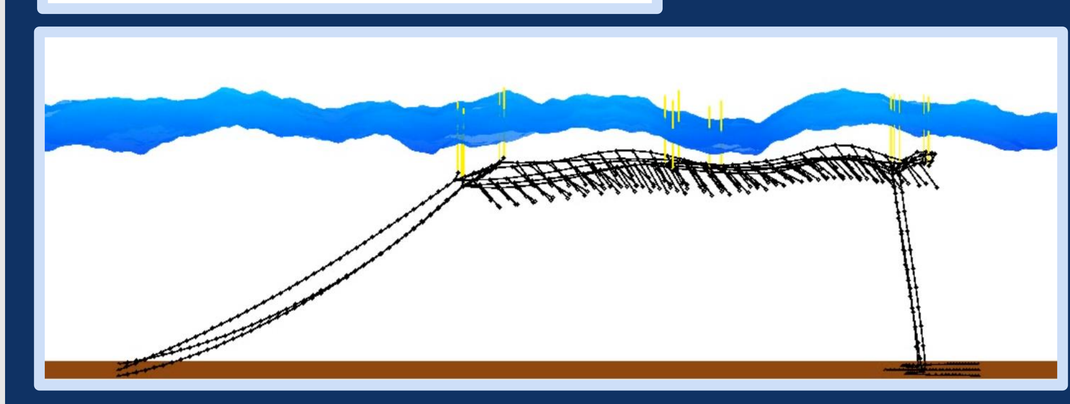

In May 2017, **Bio line** was installed in the area of C-Power park, which focuses on the study of the **growth of mussels**. **Force line** was later installed in November 2017 within the Belwind park for the purpose of almost real time **data gathering**.

## Physical parameters: wave and current

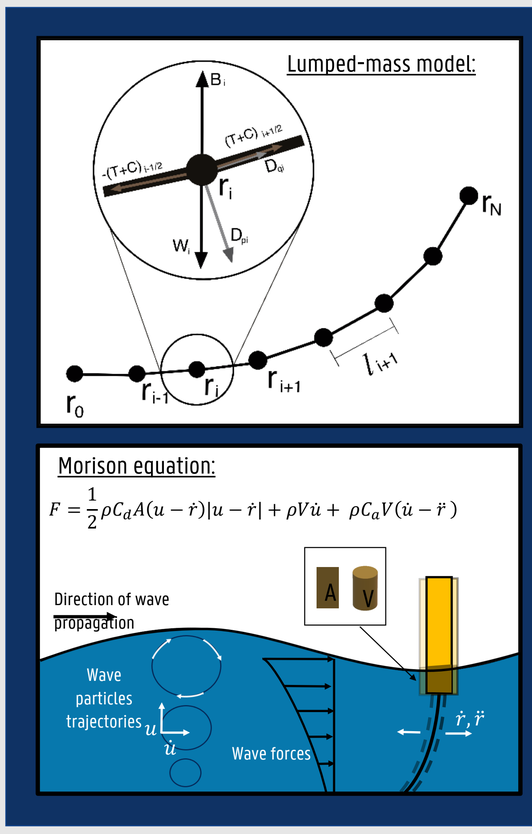



**Wave** orbital velocities and accelerations decrease along the depth. By using **linear Airy theory**, these properties can be calculated.

This information will be useful to determine the optimized depth to positioned the longline.



**Tidal current** changes direction and magnitude over time during the tidal cycle. Current magnitude decreases along the depth, which is modeled using power law profile. Displacement of a mussel line system is highly influenced by this parameter.

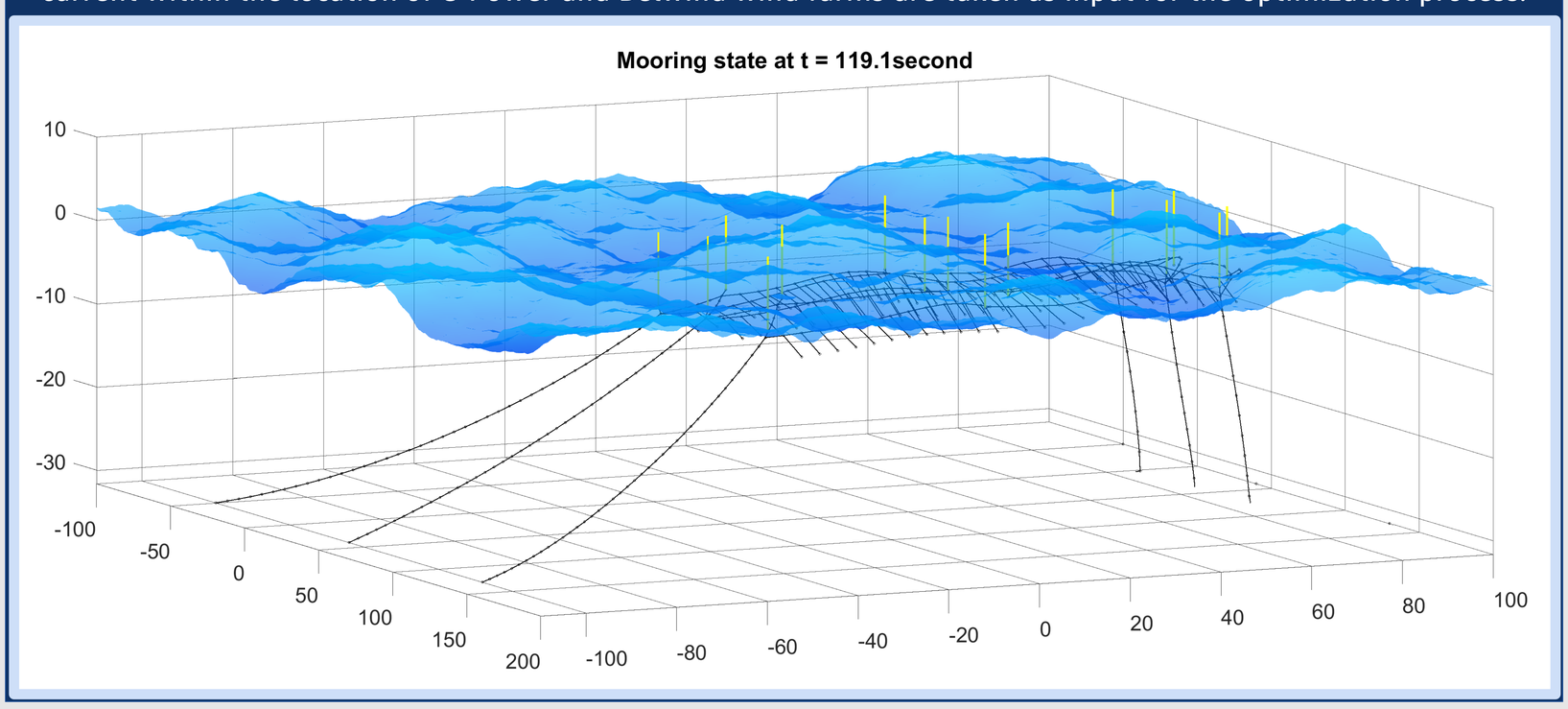


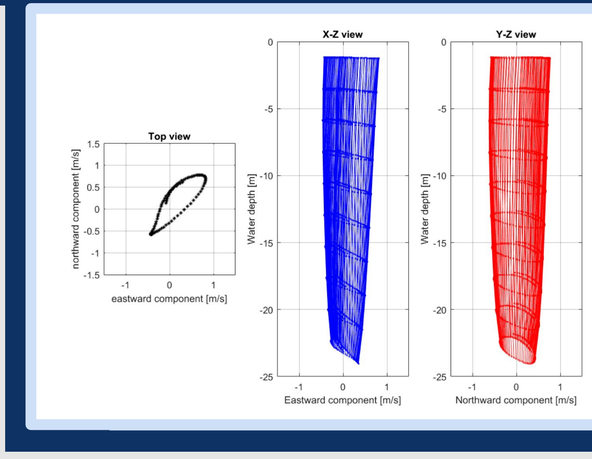

## Numerical model

A **lumped-mass approach** is used to model the mooring lines, which divides a line into N number of segments with N+1 number of nodes. Forces and weight properties of each segment are equally transferred to its extremity nodes.

The system reacts to the current, wave induced velocities and accelerations by taking into account hydrodynamic forces calculated using the **Morison Equation**.

**As a result of the project**, an optimized array of multiple longline system is proposed. The calculations are done with an in-house code, which is an adapted version of MoorDyn by Mathew Hall. Modifications to the code are mainly done to include wave and current induced loads in the calculation. The physical parameters of wave and current within the location of C-Power and Belwind wind farms are taken as input for the optimization process.




Current velocity profile

Contact

ajiebramakrishna.pribadi@ugent.be
www.maritiem.ugent.be

Universiteit Gent

@ugent

Ghent University

GHENT UNIVERSITY

MARITIME TECHNOLOGY GHENT UNIVERSITY

EDULIS OFFSHORE MOSSELKWEEK IN WINDMOLENPARKEN